

## **Response to Department of Ecologies comments on the Whatcom Conservation District ARM Project (June 21, 2010)**

*For content and individual questions addressed in this response, see letter from Department of Ecology dated June 9, 2010 in relation to “Ecology Comments on Proposed ARM Project”. The following responses were written for EPA so that they would know how WCD is addressing DOE’s concerns regarding our ARM project.*

**Background:** We created the ARM project because of recognition of the limitations of the current model in meeting the needs of the farmer and protecting the environment. We were asked by agency and tribal representatives whether there was something we could do to improve the situation. Drawing upon nearly a dozen years applying and observing the current paradigm, we identified the need for a tool that comprehensively addressed surface runoff, groundwater, and air pollution risk. Pressed by the demands of running a dairy, producers need tools that they can easily use to assess the proper utilization of their nutrients while also avoiding environmental degradation. While the DNMP instructs them to consider a multitude of factors, it does not provide enough guidance or clarity on how to give weight and reconcile each to the other. Today’s producers are typically well educated and good managers, but rarely schooled in the science of nutrient pathways and transport mechanisms. The more successful they are with this objective, the less likely it is that nutrients and pathogens will negatively impact surface and ground water. The ARM tool would interpret and give proper weight to the numerous biological, physical, and environmental factors necessary to achieve these overlapping goals. It should be noted that we are not proposing any new activities under the ARM system. We are taking current activities (i.e., manure application, winter application, etc.) and creating a tool to optimize them and make risk analysis more accessible to farmers. This project will provide the scientific data necessary to ensure the accuracy of the background calculations, and in doing so, ensure the efficacy of the tool. It should also prove valuable to agencies charged with protecting and improving the environment.

### **Response:**

**Page 2, Paragraph 4** – This is both a research and implementation project, but is primarily a research project. We understand the importance of proofing our proposed ARM tool with good science and testing and our proposal is centered around that.

**Page 2, Paragraph 5** – While DOE brings up some very important issues: improvement of NMPs oversight and implementation, vegetative practices and setbacks, and compliance and enforcement, these are not issues appropriately addressed by our research project. They are issues of much broader scope and deserve individual attention. It must be noted however, that all dairies in Whatcom county are currently required to have NRCS approved vegetative practices in place and follow manure setback distances. This is not a lacking or new measure. Additionally, this project will provide additional oversight and better implementation of manure application at agronomic rates.

**Page 3, #1-6, “Concerns about the Proposal”** – Most of these statements are too vague and provide no examples to offer clarification of; however, a best explanation is provided below for each:

1) The presentation on April 30<sup>th</sup> went over all sampling protocols including groundwater sampling, which at that time was described as using lysimeters and soil pore moisture samplers. What was stated was that we were not going to measure deep (>6 ft) groundwater, nor model groundwater flow patterns. The use of deep monitoring wells introduces too much variability from outside sources and has little to no value for our monitoring campaign. We intend on monitoring soil water within and immediately below the root zone, as well as groundwater, should it be found, within those zones. By focusing on the interactions and processes occurring around the plant root zone, we will be better able to identify those factors and practices associated with manure application that minimize loss pathways. Any nitrate that travels below the root zone of the plant is subject to leaching, denitrification, immobilization, or movement in seasonal groundwater fluctuation. Conducting a detailed analysis and evaluation of nitrate transport to groundwater below this range is not beneficial to the project outcome and will dissipate limited resources.

2) The risk factor example listed in the proposal and shown at the April 30<sup>th</sup> meeting was in relation to *surface water* runoff risk. It was not an example of a risk analysis for potential leaching to groundwater. Since they are based on different characteristics, we plan on showing the risk factors for surface water, ground water, and air quality on separate maps. However, it must be noted, that by following the risk factors and precautions (i.e., agronomic application rates, forecast, soil saturation) outlined in ARM system for one resource, you generally also address the other resources in a mutually beneficial way. We plan on working with project partners to make sure that all risk factors and evaluations are comprehensive and addressed in a scientifically responsible manner.

3) The statement made by DOE about the uncertainty of predictions in natural systems is true for all biological and chemical systems at *any* time of the year, not just winter. The point of the ARM worksheet is to evaluate the specific characteristics related to natural systems and help identify and avoid risk associated with application of manure to that system. The collection of field data will help us refine and optimize the risk calculations associated with the worksheet to reduce uncertainty and base our recommendations on sound science, not predictions.

4) The purpose of any research project is to test the hypothesis, provide information, and offer technical outreach. In our case, it is our goal to show that the ARM system is as protective, or more protective to ground water, surface water, and air as the current known, available, and reasonable technology (AKART) associated with manure application. In this case, there is available information, but no available tools to help farmers limit application risk. The ARM system does not supplant the current practices of agronomic application and adequate storage, but rather creates a tool that works in conjunction with and optimizes these practices, while also providing an additional level of protection to resources. Furthermore, with a better understanding of these dynamics should come greater certainty as to what is meant by “adequate storage”. The typical guidance of six months of storage is a subjective conclusion that in some circumstances is woefully inadequate. Storage in excess of needs should be avoided because of

the implications relative to lagoon integrity and the misinterpretation that addition storage is a replacement for good and efficient management..

5) The issue of “adequate storage” is important, however, it is not independent of the processes of proper application or crop utilization, which are addressed by this project. All of these systems must work in concert for effective manure management to occur. The information to be gained from this project will help us better understand the interconnectivity of these systems and evaluate the environmental risk associated with manure application to farm fields at *any* time of the year, not just in the winter months. It must also be reiterated that the ARM system is *not* a substitute for adequate storage. Storage needs are addressed in individual DNMPs and are based on animal numbers, estimated manure production, localized rainfall, runoff collections, and crop rotation, and can vary greatly by operation. The utilization of the ARM system will lend more support to that evaluation, not supplant it. Additionally, it should be noted that in Whatcom County, and areas with similar soils and climatic conditions, the number of farms with fields that qualify for early season (Jan-Feb) manure application are fairly limited (~10% of the total available acres), so it is not feasible to use this as a method of storage mitigation. The benefits of winter application are better utilization, growth, and uptake by crops, not waste elimination. With a better understanding of the nutrient management system, regulatory agencies will be in a better position to assess risk at each step and conclude what is an appropriate margin of safety for manure storage on a case by case basis.

6) It is unclear if this is a general statement directed at regulatory agencies (WSDA, DOE), or in direct relation to the ARM project. As to the latter, it can be assured that project farms will be under a higher level of oversight and scrutiny compared to non-project farms. Records of manure application, along with soil and manure tests will be collected for all test fields as instructed by project guidelines. Additionally, all completed ARM worksheet will be submitted to WCD for review and approval prior to application. In addition to providing feedback, this will ensure that all steps have been followed and that proper manure application is taking place.

**Page 3-4, #1-8, “Suggestions for Improving the Study”** – See comments below for each point in this section.

1 a) As stated in the project proposal, all farms participating in the study will undergo an update of their DNMP, which requires re-approval and re-certification. All plans are available to WSDA inspectors as dictated in applicable rules and regulations. Additionally, it is important to note that *all* Washington dairy operations are required to have a dairy nutrient management plan (DNMP) that outlines the appropriate use of nutrients based on desired environmental protection objectives, which will vary by producer and region. Within the DNMP are guidelines and NRCS approved practices to meet all State and local laws such as the Critical Areas Ordinance and Manure Ordinance, as well as requirements for nutrient management (NRCS 590) which includes fall nitrate testing, P-index analysis and protection measures for surface and ground water. All DNMPs are written so that animal numbers, estimated manure production and runoff collection, and land base are in balance with manure storage availability. Whatcom County has the strictest regulations and guidelines in the State, and we are proud to be progressive and responsive to the challenges that we face in this area.

**1 b)** Both anonymity and confidentiality of test farms and information will be practiced to ensure the protection of test farms from unnecessary scrutiny and attention which may alter study results. WSDA will have availability of test farm participants on a case by case basis as it relates to the WSDA inspector necessitating proper enforcement and adherence to dairy rules and regulations as outlined in their DNMP. Test farms will keep accurate records of all manure application dates and rates as outlined in their DNMP, and follow all ARM worksheet guidance as dictated by the project guidelines.

**1 c)** We will not be using permitted CAFOs as test participants in our project.

**2 a)** All soil types associated with a farm will be outlined and their individual characteristics assessed on a field level. That information is used to create overall risk ratings and identify the primary risk factors (i.e., groundwater, surface water, air) associated with the field.

**2 b)** The exclusion considerations requested by DOE are not an effective means of protecting ground or surface water pollution. The only effective means of mitigation is to increase analysis or resources, education, and accountability in areas of high risk. By not testing the ARM system in these areas, it eliminates the most important areas where our efforts will be effective. The ARM system does not encourage any activities that will increase the current rate or potential of pollution. In fact, when used effectively, the ARM system will decrease surface water, groundwater, and air pollution concurrently. Limiting working areas within the County is not an effective means of protection of resources. Our farm site selection will be based on producer compliance, location within the watershed, and risk factors. We intend on conducting our study in representative areas of the project Watersheds (Noocksack, Strait of Georgia) to ensure we are able to account for the unique factors located within each area. Applying DOE suggested guidelines to all applications throughout the year is not appropriate and precludes current guidelines set forth by NRCS and local laws and ordinances. It must be noted that all of the factors listed, except #i, are already addressed in DNMPs (see below):

**i)** A review of current groundwater nitrate levels will show that the majority of agricultural areas within Whatcom County are above the DOE suggested threshold of 5 mg/L. This suggests that these areas are in need of a system to help reduce nitrate formation and transport to groundwater. Instead of limiting our project farms based on this threshold, it seems more appropriate that we use that threshold to target these areas for ARM analysis to be able to optimize the system for maximum benefit in these high risk areas. The ARM system is designed to eliminate the factors that currently contribute to fall nitrate leaching, and prevent application practices that would increase potential for N transport at any time of the year. The inclusion of the ARM system to high risk areas will likely serve as a means of *reduction* of nitrate movement, not as a contributor. The project is designed to demonstrate this through careful testing, analysis, and technical assistance.

**ii)** The use of the fall soil nitrate level is a very inappropriate value to use for any type of regulatory purpose. The fall nitrate test is used as a tool for farms to gauge how their manure application rates matched the crop needs for the year by what is left over. It is a “yes or no” tool, not a definitive value of nitrate availability, and is not valid for any type of application rate decisions the following year. This is because nitrate levels will vary significantly after the fall

because nitrate is highly susceptible to movement into the soil profile, dilution, and conversion with increased precipitation and decreased soil temperatures. Due to these factors, it is highly variable depending on when samples are taken and notoriously unreliable. Taking soil samples just prior to manure application is a much better gauge of available N in the soil profile. Our project will be taking fall and spring soil nitrate levels and correlating them to other measured factors to assess their usefulness and affectivity within the N system.

**iii)** According to NRCS nutrient management (590) guidelines, which are included in *all* DNMPs, all fields with a P-index of high or very-high are either applied to at P levels, which are usually considerably lower than typical N application concentrations, or not applied to at all. This guidance is always followed.

**iv)** Vegetation density is already accounted for in the ARM proposal. We have stated that vegetation must have at least a 75% stem density for a field to be considered for application during high risk times. Bare fields, such as corn fields, are not eligible for early season application (i.e., Jan-Feb). Only grass fields and vigorously growing cover crops that will be harvested are eligible for early season application. Corn fields are allowed to be applied to when conditions and timing are appropriate (i.e., April-May).

**2 c)** Some type of vegetative buffer (i.e., filter strip, relay crop, cover crop) is already required for all dairies in Whatcom County. All farm fields used in the study with an adjacent waterway or wetland area will have a buffer already in place. Buffer width and characteristics is required information in the ARM worksheet.

**2 d)** Seasonal application setback distances are already required for all farms in Whatcom County and are outlined in the DNMP. Setback distances are required input in the ARM worksheet.

**3)** We will be partnering with Western Washington University and Agriculture and Agri Food Canada on groundwater monitoring activities and analysis. We will also be consulting with USGS on groundwater monitoring and methods. We will follow all laws, regulations, and SOPs relating to those monitoring activities.

**4)** Sampling procedures are already outlined in the proposal including the use of paired testing (before and after), as well as the use of controls for determination of system affectivity.

**5)** By scaling back the number of test fields to that proposed by DOE (8), we would not be able to draw any statistically significant conclusions, nor be able to minimize variability enough to draw a conclusion over an area larger than the sample field. The number of test sites and samples taken will be based on statistical sample size calculations that account for variance and confidence level ( $\alpha = 0.05$ ). By sampling based on statistically valid sample numbers, we will ensure a reduction of variability and a representation of a larger sample area. With assistance from graduate students at Western Washington University, all samples will be taken in a timely and appropriate manner. We are not concerned about lack of staff time or availability for sample attainment.

6) Similar to comments on #5 above, we will choose a statistically valid number of sample plots to attain the desired results. Additionally, there will not be one “control site”. Having one site that all other test farms are compared against is not a proper statistical model in this case and will not yield any valid conclusions. Particularly since field characteristics, weather conditions, and management are highly variable from farm to farm. Instead, we will have control fields at each test farm and/or adjoining paired test farms to ensure that control and sample plots are being accurately compared based on similar soil type, weather conditions, manure type, management, etc.

7) Sampling of crop for nitrogen, as well as other components (i.e., soil, manure, water, air), is already outlined in the proposal. We will be testing nitrogen throughout the system (air, water, soil, manure, crop) in order to determine its preferential pathways throughout the year, as well as the effect of the ARM system on crop N uptake and loss.

8) The ARM system will not be implemented County wide until the system has been properly evaluated and all outreach tools developed. All project partners listed in the proposal will be involved in that process and have input into the success and viability of our end product.

**Page 4-5, Paragraph 8-1** – All ARM project participants must follow all guidelines, laws and regulations currently in place. By being involved in the project they are *not* granted immunity from regulations nor are they allowed to have a discharge. All project participants will be presented with a disclaimer that states that they are ultimately responsible for their actions and the consequences that go with them.

For further clarification on any of these points, please contact:

**Nichole M. Embertson, Ph.D.**  
Lead Scientist, Project Coordinator  
*Sustainable Livestock Production Program*  
Whatcom Conservation District  
6975 Hannegan Road  
Lynden, WA 98264  
O: (360) 354-2035 x 126  
F: (360) 354-4678  
E: nembertson@whatcomcd.org  
W: www.whatcomcd.org